

Human Health and Recreational Indicators

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Survey of the Nation's Rivers Planning Meeting
, San Antonio, TX
January 10-12, 2007

Why Include in Survey?

- Direct and indirect links to human health
- Pathogens
 - Enterococci (*an indicator of pathogens*)
 - Contact via swimming, boating, water sports
- Fish tissue
 - Consumption of recreationally-caught fish
- Aesthetics?



Enterococci

- Good indicator of pathogens in both fresh & marine waters
- Shows a moderate correlation to swimming-associated gastroenteritis
- *E. coli* good indicator in fresh water



Why Not Fecal Coliform?

- Prior to 1986 this was the recommended indicator organism
- Epidemiological studies showed no correlation with swimming- associated gastroenteritis
- Fecal coliform group includes not only *E. coli*, but others present in soils or decomposing organic matter such as leaves/wood
 - *Klebsiella* – present in pulp/paper/textile mill effluents)



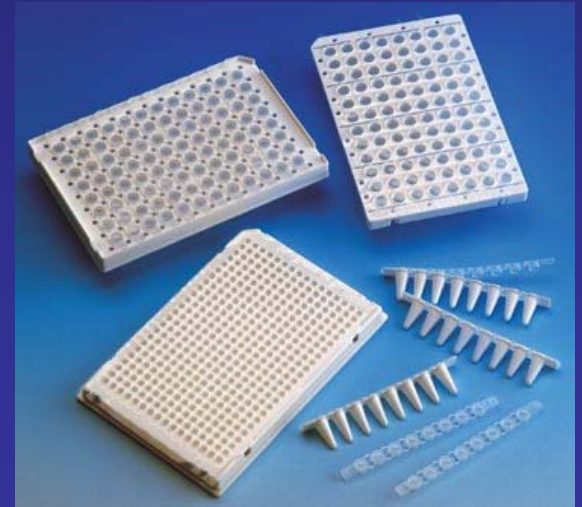
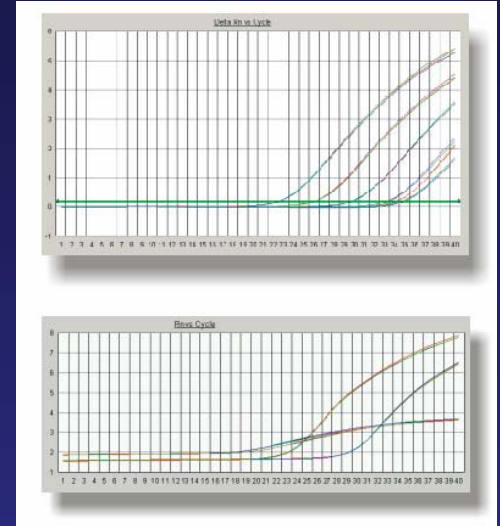
Pathogen (*Enterococci*) Sampling for Lakes

- Sampled offshore of the final physical habitat station
- Collected in 1-L pre-sterilized, polypropylene bottles at appropriate sampling depth (6-12 inches below water surface)
- Samples will be filtered and frozen within 6 hours of collection



Enterococci Processing and Analysis

- Samples processed and analyzed using methods developed by the U.S. EPA National Exposure Research Laboratory (NERL)
- Analyzed using a Quantitative Polymerase Chain Reaction (QPCR) method
 - a genetic method that quantifies a DNA target via a fluorescently tagged probe



RESEARCH & DEVELOPMENT

Building a scientific foundation for sound environmental decisions

Fish Tissue



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-Options-

- Wildlife Exposure
 - Whole fish
 - Species and size representative of what is commonly consumed by wildlife
 - Short lived – recent exposure
 - Long lived – longer term exposure
- Human Exposure
 - Fillet
 - Species and size targeted by humans for consumption



-Options-

- Endocrine Disrupting Chemicals (EDCs)
 - Requires fish be sexed
 - Problematic to do in the field on a national scale
 - Genetic markers to sex fish have not been developed
 - Sample type collected
 - Field dissection – (time and expertise issue)
 - Whole fish collected and dissected in the laboratory
- Pharmaceuticals, Personal Care Products (PCPP's)



Logistical Considerations

- All will require the development of regionally/resource adjusted targeted species list
- Requires that samples be kept chilled in the field and later frozen

